

Missouri Department of Natural Resources

## Total Maximum Daily Load Information Sheet

### Upper Shoal Creek Watershed, including Pogue and Joyce Creeks

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#### Water Body Segment at a Glance:

<b>Counties:</b>	Newton, Barry
<b>Nearby Towns:</b>	Wheaton, Purdy
<b>Lengths of impairment:</b>	
Shoal Creek	17.5 miles
Joyce Creek	5.0 miles
Pogue Creek	2.5 miles
<b>Pollutant:</b>	Bacteria
<b>Source:</b>	Rural Nonpoint Sources



**TMDL Priority Ranking:** TMDL approved 2003, revision approved 2007

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#### Description of the Problem

##### Beneficial uses of Upper Shoal Creek Watershed

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health (Fish Consumption)
- Irrigation
- Cool Water Fishery
- Whole Body Contact Recreation
- Secondary Contact Recreation

##### Use that is impaired

- Whole Body Contact Recreation

##### Standards that apply

- Missouri's Water Quality Standards at 10 CSR 20-7.031(4)(C) state that the fecal coliform count shall not exceed 200 colonies per 100 milliliters of water (200 col/100 mL) during the recreational season (April 1- October 31) in waters designated for whole body contact recreation.

## **Background Information and Water Quality Data**

The U.S. Environmental Protection Agency approved the Shoal Creek TMDL November 18, 2003. Recently, Pogue Creek and Joyce Creek (tributaries to Shoal Creek) and another segment of Shoal Creek were proposed as additions to the 2004/2006 303(d) List due to high levels of bacteria. However, since they are all three within the watershed that is being addressed under the existing and approved Shoal Creek TMDL, they will not be added to the list. Instead, the department has revised the Shoal Creek TMDL to include specific references to and load allocations for these segments. EPA approved this revision on November 21, 2007.

In studies performed from 1958 through 1979, the water quality in Shoal Creek was reported as excellent and the stream pronounced “unpolluted.” In a United States Geological Survey (USGS) report in 1992, it was described as a true Ozarkian stream with rolling Ozark hills, picturesque mill dams, bedrock riffles, gently eddying pools and long shaded reaches. However, Shoal Creek is presently listed as impaired due to levels of fecal coliform bacteria above state water quality standards. Fecal coliform are non-pathogenic (do not cause human illness) bacteria that are found in the gut of warm blooded animals and are used as indicators of the risk of waterborne disease from pathogenic bacteria or viruses.

To deal with this problem, the department wrote a TMDL for Shoal Creek (upper). The goal of the TMDL is to bring Shoal Creek and its tributaries back to the Water Quality Standard of 200 col/100 mL. The Food and Agriculture Policy Research Institute (FAPRI) at the University of Missouri performed an analysis and simulation of the Shoal Creek Basin (watershed) to determine how much bacteria were in the creek and how they got there. This study also attempted to determine the source of bacteria using genetic analysis, known as DNA Source Tracking. The goal was to identify if humans or specific types of animals, such as cattle, horses, or poultry, were the primary source of contamination. These studies indicated humans and cattle were the major contributors of bacteria, with other domestic animals and wildlife making a smaller contribution. Poultry litter was found to cause significant loading only during periods of high surface runoff, which occurs less than 15 percent of the time.

To come up with remedial actions that could improve the stream, FAPRI ran several scenarios using the Soil and Water Assessment Tool (SWAT) model. This model can assess which alternative management practices will lead to in-stream bacteria levels that will meet the Water Quality Standard. The following scenarios show the most promise for reducing the fecal coliform concentrations in Shoal Creek:

- A 100 percent reduction of the sanitary sewage that reaches the stream,
- A 50 to 100 percent reduction of the cattle standing in the streams, and
- A 66 percent reduction in the fecal coliform loadings due to surface runoff events.

To achieve reductions of bacteria in the creeks, a voluntary citizen action group was formed in 2003 from stakeholders in the upper Shoal Creek Watershed. Since that time, the Shoal Creek Watershed Improvement Group has become a 501(c) 3 (not-for-profit) organization and has conducted or participated in the following activities toward achieving those goals:

- Educational meetings with landowners on regulations and recommended practices for the proper siting, design, installation, operation and maintenance of septic systems.
- Offering monetary incentives to landowners to maintain (pump) their septic tanks.

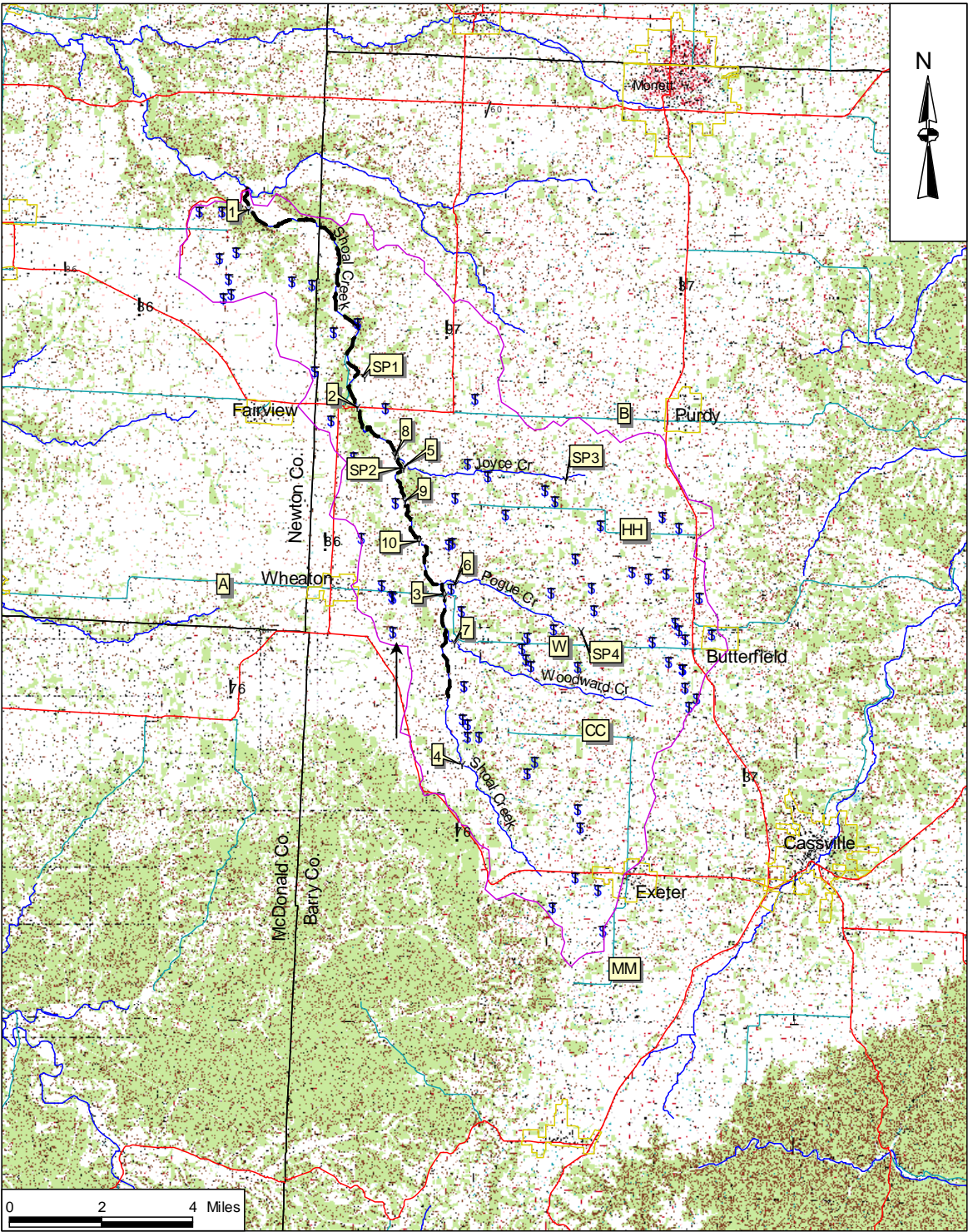
- Offering monetary incentives to landowners to repair and/or replace their failing septic systems.
- Demonstrating efficacy of creek-pasture ponds as the primary source of livestock drinking water to attract cattle away from the creeks.
- Educational meetings for developing Nutrient Management Plans.
- Educational meetings for poultry litter haulers on regulations and recommended practices for spreading litter.

Additionally, this watershed is one of the targets for cost-share with federal and state agency partners that includes the following practices:

- Construction of poultry litter stacking sheds.
- Alternative water sources for livestock with rotational grazing systems.
- Installation of stream buffers and livestock exclusion from streams.
- Development and implementation of comprehensive nutrient management plans (CNMPs).
- pH correction of soils on farms utilizing CNMPs.
- Transport of poultry litter out of the watershed.

A map with sampling sites and graphs of data may be found below.

# Shoal Creek in Barry and Newton Counties, Missouri, Showing Sampling Sites and the Impaired Segment

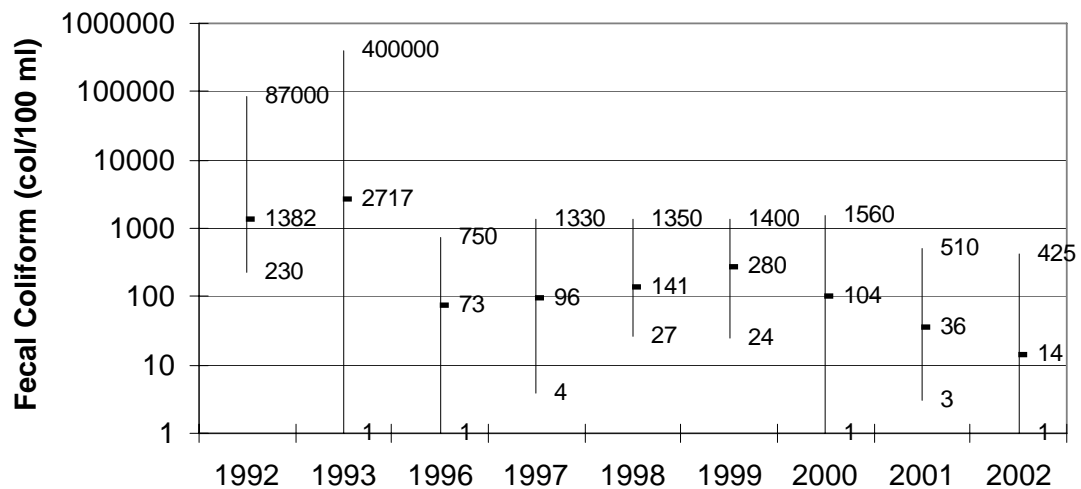


- Impaired segment
- Direction of Flow
- Concentrated Animal Feeding Operations
- Outline of watershed for the impaired segment

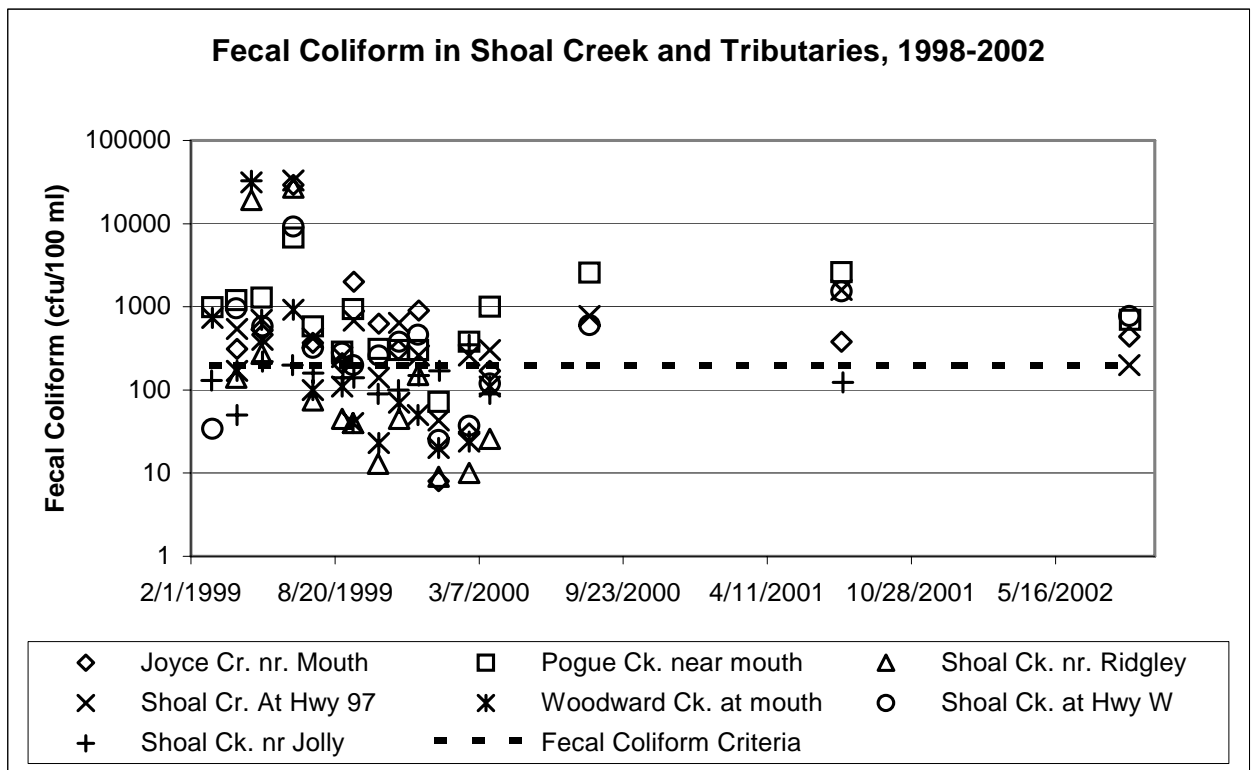
### Index to Sampling Sites

1. Shoal Creek near mouth of Capps Creek
2. Shoal Creek at Highway 97
3. Shoal Creek at Highway W
4. Shoal Creek near Ridgley
5. Joyce Creek near mouth
6. Pogue Creek near mouth
7. Woodward Creek at mouth
8. Shoal Creek at County Road 2090
9. Shoal Creek at County Road 2100
10. Shoal Creek at County Road 2110
- SP1. Renkoski Spring
- SP2. Roller Spring
- SP3. Fly Spring
- SP4. Dilbeck Spring

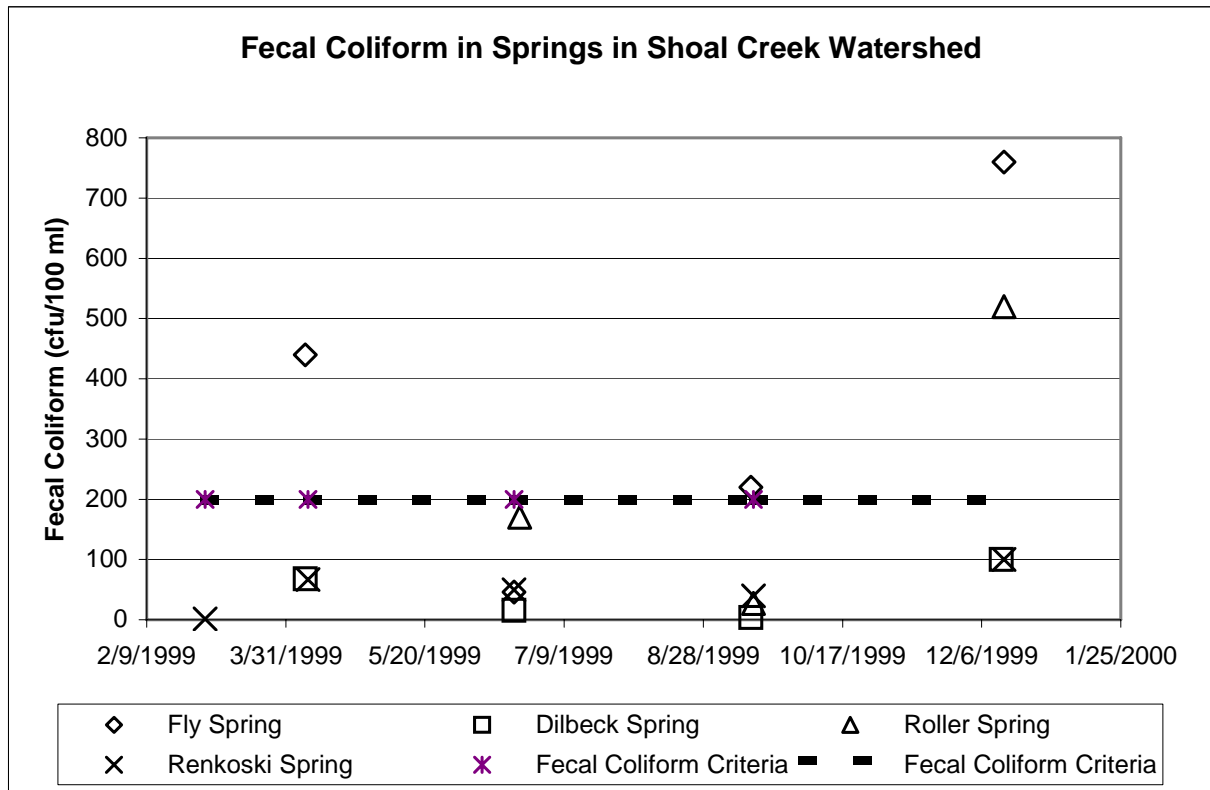
### Ranges and Geometric Means of Fecal Coliform Levels in Shoal Creek at Highway 97



Source: Crowder College

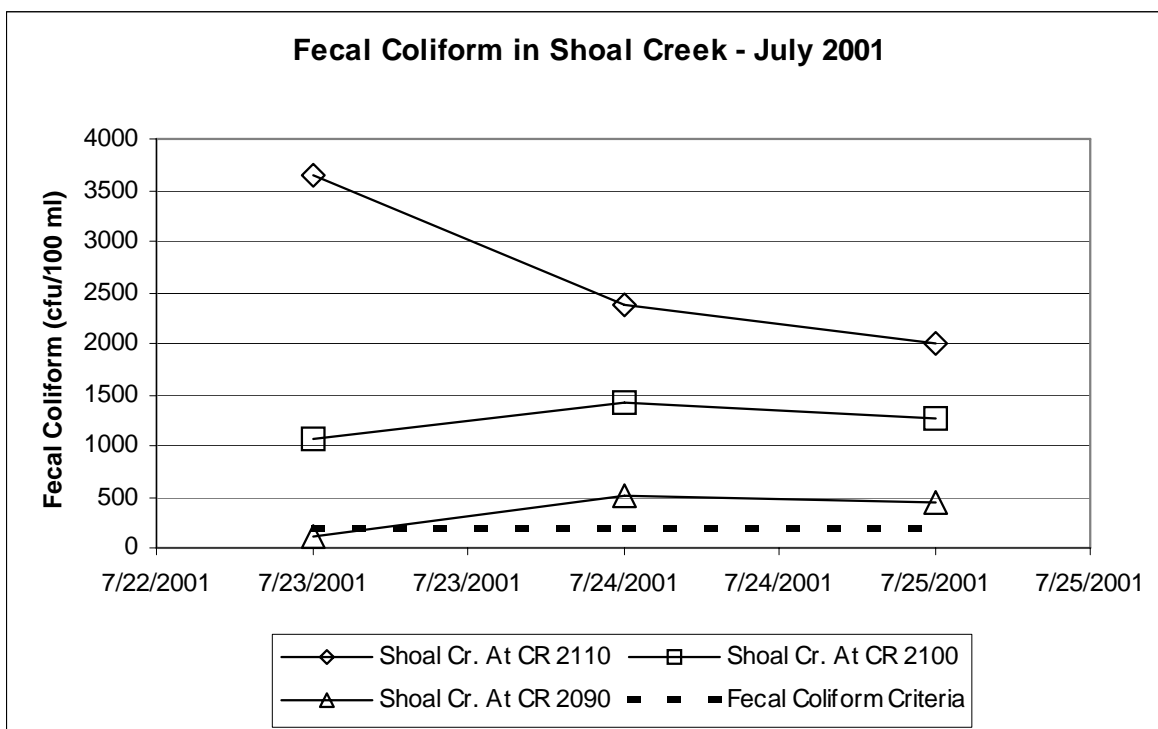


Source: United States Geological Survey

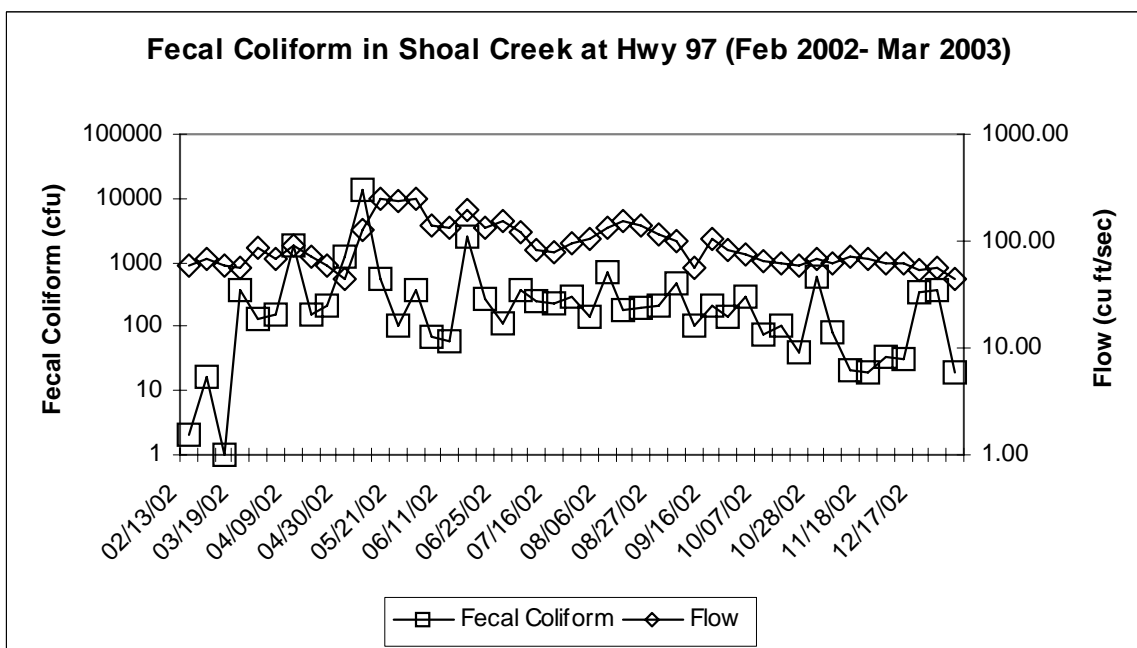


Source: United States Geological Survey





Source: United States Geological Survey



Source: Food and Agriculture Policy Research Institute

**For more information call or write:**

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